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ABSTRACT

Geography, the "Mother of Sciences," antedates other disciplines and has its origins in antiquity when Greek scholars compiled descriptions of the earth in so-called "topographias." Since then, other sciences have branched out and geography has become the subject of much controversy. Taught in the United States in conjunction with other disciplines, or perhaps not at all, geography is emerging as an all-embracing science and as a bridge between physical and social disciplines. A primary recommendation is for geography to align itself with the environmental sciences--rather than social studies--or to assert itself as an independent subject. Education of geographic technicians, improvement of the tools of the science (maps, photography, atlases), and perfection of new techniques in graphic representation are immediate needs. Computerized operations offer a new key to data reduction and perhaps will dominate scheduling of priorities. The challenges of our earth, as well as the challenges of the solar system, give the science a new impetus and a new direction. (Author/JMB)

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GEOGRAPHY in Teaching and the Future

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Geography, the "Mother of Sciences," antedates other disciplines and has its origins in antiquity when Greek scholars compiled descriptions of the earth in so called "topographias." Since then, other sciences have branched out and the role of geography became the subject of much controversy. Even in this century, geography alternately enjoyed the reputation of being a "fundamental subject," as well as the ignominy of being classed a "catch-all subject which has little strength of its own." (1) Now, geography is again in the limelight as an all-embracing science and as a bridge between physical and social disciplines.

Early in the nineteenth century, Kant's philosophic exposition caused the emergence of modern geography. The spatial relationships of facts became the foundations for the new direction in the science. Soon, Alexander von Humboldt, Karl Ritter, and others, translated philosophy into practical and academic pursuits.

In England, geography developed as a means to inventory an expanding empire. Surveyors and cartographers were the principal contributors to the science within the British Empire. In other respects, however, geography remained descriptive. (2) Indeed, it was in central Europe where the science approached a golden age. Famous names like Richthofen, Ratzel, Kiepert, De La Blache, Kirchhoff and Krümmel, represented the vanguard of a highly developed science. Central Europe continued to be the scene of geographic research and advancement.

GEOGRAPHY IN NORTH AMERICA

The English mold shaped the entire English-speaking world. In North America, practical solutions to immediate problems and privitivism preoccupied Canadians as well as Americans. The needs of the moment took precedence over long-range considerations and the far distant requisites of tomorrow. The historian Charles A. Beard summarized: ".... the people wrestled with the reality of an abundant nature and the problems of self-government." (3) Geography in North America, was thus hewn into forests, sighted on the Jacob's staff, fanned in the campfires of trappers and settlers and reflected in the reports of traders, soldiers and recruiters.

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In a more tangible sense, American geography was stamped on the cargoes of dried cod from Newfoundland, the bales of fur of the Hudson Bay Company and the hogsheads of tobacco from Virginia. Explorations and surveys were the major geographic expressions of that era. Cartographers and surveyors were highly respected and quite influential. Colonial maps were destined to affect political decisions, military operations, peace treaties, boundaries and even the reconstruction of historical sites.

The English pattern of using geography primarily as a means to inventory a vast empire, had effects on North America. The American Geographical Society was a "central clearinghouse for geographic information." (4) Practical geography, like the recommendations to insure the most efficient use of land by U.S. Army major John Wesley Powell, brought admonitions from the Congress of the United States by enjoining the officer to "stick to geologic work." (5) The message of George Perkins Marsh was not understood in his time either. In his book, The Earth as Modified by Human Action, Marsh had pointed out how man had changed and ravished the earth. (6) At that time, America was interested in huge and immediate profits and the bounty of the land seemed inexhaustible. Alexis de Toqueville could observe that Americans".... will habitually prefer the useful to the beautiful and they will require that the beautiful be useful." (7)

At the turn of this century, geography came to America, but it remained a little known and little understood subject. The Reclamation Act of 1902 was a recognition of deep-rooted problems, but typically, the act was opposed and defeated by contemporary politicians. (8) The scientific aspects of geography were relinquished to other disciplines, notably geology. Confusion and doubt brought disintegration and confusion. (9)

GEOGRAPHY IN EDUCATION

In the schools, geography was recognized as a subject "becoming a young gentleman." (10) Unfortunately, it found a favorable reception "only here and there." (11) Geologists recommended that geography be taught to achieve a more balanced treatment of the sciences (12) but Americans remained unfamiliar with the world in which they lived through two world wars. Geography remained "not one, but several revolutions behind." (13) Moreover, in the late twenties, social studies fused geography with other subjects and the elimination of the science from college admission requirements dealt the final blow to geography as an independent subject in American elementary and secondary schools. (14)

With a history of disunity and vacillation, the teaching of geography in North America is still far short of the goals sought by professionals. The beeps of Sputnik in 1957 brought revisions in school curriculums that brought back elements of physical geography under the earth science label.

Samplings have shown that most Americans know what erosion means, know that the planets revolve around the sun and that the earth's surface is covered by more water than land. (15) Conservation and much publicized concerns about pollution, have also affected the teaching of the science. However, few students are aware that such studies are geographic in nature.

Elementary School Geography. At the elementary level, geography is usually taught as an adjunct of social studies. It is in the fourth and fifth grades that American children are expected to learn geographic terminology, how to read maps, how to recognize physical features of the area in which they live and to become familiar with political, social and historical facts. In practice, these goals are not necessarily achieved. Only a minority of elementary school teachers has been exposed to geographic education. There is unmistakable emphasis on historical and political study. Geography at the elementary level is, at best, descriptive. Teaching aids are largely geared to teaching a variety of social subjects. In 1894 the Report of the Committee of Ten recommended the use of good atlases and wall maps. In 1914 the Committee for the Teaching of Geography also deplored the shortage of adequate maps and atlases. (16) At the present time publishers have produced excellent geographic teaching aids and maps. Thus, the fault lies with teachers and administrators themselves. They, in turn, are subject to the desires and wishes of the community they serve.

Certification requirements for elementary school teachers in most U.S. states, call for history and economics, but geography courses are largely optional. There is a realization that all too few teachers understand the subject. At the elementary level, the travesty of geography as part of fused programs, is not even useful. (17)

The High School Program. Although geography was taught in one form or another, the subject was definitely a neglected one. The plight of high school geography was eloquently expressed in the introduction to the teaching kit "Geography in an Urban Age" that was prepared by the Macmillan Company in 1970:

> "In recent years, school geography courses have seldom sparked much interest among students or teachers. The revolution in content and methods that so dramatically affected other curriculum areas, seemed to evade geography. Courses consisted mainly of memorizing names of countries and their capitals, the kinds of products produced in different areas, and the location of mountain ranges and rivers. There was a sprinkling of other more important and meaningful information, but inevitably, the student became submerged in a flood of unrelated, insignificant data."

In most American schools, geography is optional. In Canada, by contrast, only the Province of Alberta does not require the subject in several years of high school attendance. (18) A 1962 survey by William L. Mayo, disclosed that even under optimum conditions, geography reached a small percentage of American students. Texas was leading with 36.9 per cent; in Virginia it was 13.7

per cent; while Mississippi ranked lowest with only 1.5 per cent of high school students enrolled in geography courses. A closer examination revealed that even these figures are deceptive in that fused programs were included in the survey. In 1970, Virginia enrolled 14 per cent of high school students in geography courses. However. 9 per cent took subjects like "U.S. History and Geography" and only 5 per cent were enrolled in unadulterated geography offerings. (19)

Endorsements to teach geography as an independet subject were granted by only 10 states. For the most part, social studies teachers gave geographic instructions when required. Yet, certification in social studies may not require courses in the discipline at all. This is a dismal picture indeed. Kohn lamented in Problems and Trends in American Geography: ...."there is a serious shortage of teachers who understand and are able to transmit the structure of geographic knowledge and methods to young people..." (20)

In 1964, the Committee of the National Council for Geographic Education in the United States, drew 17 recommendations that hold promise for the future. Inductive learning through problem-solving and extensive use of models, could make future geography lessons both useful and interesting. In October 1969, the U.S. government sponsored American Education Magazine summarized the new program:

> "The High School Program grew out of a study done in the early 1960's by the Association of American Geographers and the National Council for Geographic Education. It found the geography education picture in the United States to be dismal at the elementary, secondary, and even college levels. The project was designed to change that picture as economically as possible .... With the resulting materials, even persons not trained in geography can do a better job of motivating students." (21)

Indeed, there is hope for geography and even the sister sciences have taken notice of a "very militant stand." There is now a fear that geography may "preempt much of the place formerly occupied by history." (22) Yet, the stress on materials, on models that are coming in vogue elsewhere, is not the only solution to the myriad of problems.

Fundamental geographic knowledge of high school graduates and the public in general is limited. Samplings have illustrated that Americans have a spotty knowledge of the world. At a prestigious college in Virginia, samplings of seniors in 1970 and 1971 used the technique of requiring students to mark given locations on an outline map of the world. The results showed that 56 per cent had placed the Iron Curtain at least 1,000 miles to the east; Viet Nam could not be shown by 54 per cent; Antarctica was omitted by 58 per cent; Newfoundland could not be identified by 62 per cent. Needless to say, remote and little populated areas were properly labeled by very few students. (23)

In Europe, by comparison, it would be unthinkable to teach geography without an atlas. The similarity of course content in European schools

- including the Iron Curtain lands - indicates that geography continues to be a major subject that is taught at all elementary and high school levels.

The goals of geographic instruction in Europe were summarized by Albrecht Penck in Erdkunde im Gymnasium: 1. The acquisition of knowledge and facts; 2. using and understanding maps; 3. relating map data with reality; 4. knowing the origin of landforms and ability to recognize them; 5. interrelating physical and cultural forces; 6. studying the socialization of space. Penck observed: ".... the ability to perceive the mutual and interlinking existence of things and events, comprehension of changes in conditions that occur between seemingly unrelated phenomena and processes, is one of the noblest, if not the highest aim of geographic instruction." (24)

College Level Geography. Institutions of higher learning are dedicated to teaching, research and service. Subjects offered vary and so do methods. Geography is not conspicuous. Less than 1 per cent of American graduates majored in this field. In Canada it was 1.1 per cent. (25) In the Soviet Union about 3 per cent of the university graduates obtained geography degrees. Since the fifties, 1.2 per cent of Soviet graduate students pursued advanced studies, as compared with 0.3 per cent in the United States. (26) Another factor is the preponderance of male students not only in geography, but also in allied sciences like geology. At the secondary level, the female teachers still represent the majority.

College geography is beset by a number of problems. There is a lack of opportunity in finding this science offered in courses and there is a lack of occupational opportunities. Other courses are frequently substituted for geography which is still classed as an art subject by many universities. Only a limited number of institutions bestow doctoral degrees in the science, 29 in the United States and five in Canada. Thus, the discipline is relatively insignificant and is further handicapped by a lack of incentives. This has channeled many prospective students into other fields. The use of geographers in industry and government has been far from spectacular and not all the universities have offered geography courses that were either relevant, useful or imaginative. Regional geography has been prevalent.

The lack of relevance has not only encouraged the adoption of geographic subjects by sister sciences, but has left the discipline bereft of substance. Geography is weak in expressing and formalizing theory. (27) The products of the universities have shaped geographic education at other levels. While geography has been a part of social studies curriculums for some time, a new trend developed in the establishment of Schools of Environmental Studies. Geology, Oceanography and Geography fused to form this new academic entity. This fusion of the earth sciences parallels the earlier developments in the social sphere and may submerge geography as an independent science, or could bring the final split between scientific and social branches. The near future will be decisive for the science.

INTROSPECT AND PROSPECTS

The variety of definitions and the conflicts over the goals of geography, have disillusioned many and have brought disunity and disruption. Geography has confused not only those outside the discipline, but also those within. (28) Research has produced interesting results, yet, has failed to come up with startling new ideas that could affect events, would advance solutions to problems, or would bring academic geography before the public. Involvement in decision-making and current problems provides a new and exciting arena for the science. With pressing urban and social problems, with the depletion of resources, with the spectre of pollution and water shortages, with the venture into space, with swiftly increasing populations and a problematic "green revolution, cooperation is needed. Triumphs by politicians with limited vision must not be allowed to happen again. At the same time, the excesses of total planning and control loom beyond the horizon.

The evaluation and assessment of facts permits to draw conclusions on which forecasts and predictions may be based. Geographers have made amazing predictions in the past and can continue to make vital contributions in this field in the future. Cooperation with engineers, planners, administrators and other sciences will be a necessity.

As a first step, geographers must set their own house in order. The clashes between historical and functional schools are of little avail. Disdain for determinism does not expunge the errors of the past, nor does it alter the existence of the physical environment. The key figure in all geographic research has been and is Man. Research in all branches of the science has man in mind as exploiter or as benefactor, as subject or as shaper. The map remains the geographer's most important tool. The whole, interrelated world is the geographer's field of action. The global scale of geographic investigations remains the strength and specialty of the science. It requires versatility and flexibility.

Despite the abundance of definitions, the goals of geography are quite explicit. Interrelationships between cultures, environments, locations and situations are subject to geographic investigation. The second element is the representation of crust features. With the transfer of human activities into space, geography becomes once again instrumental in the inventory phase of celestial bodies which have become the target of human exploration. The third factor is the global nature of the science. This requires close cooperation with other disciplines, but provides the inter-and extra disciplinary climate for geographic investigation. Yet, geographic research must not be usurped by other sciences. In a broad sense, the use of maps marks any research as geographic. Unfortunately, such subjects are no longer the geographer's undisputed domain. Oceanographers investigate wetlands and coastal plains; geologists concern themselves with resources; architects and engineers use maps and construct "cultural features" - often disregarding the interrelationship of man and nature -, ecologists study the environment; sociologists seek answers to population patterns. Existing geographic research is often disregarded. When a zoo is built, specialists from all over the world study the conditions of animal environments as well as the habits of species to make up for a lost habitat. In urban planning or

renewal projects, man is rarely the subject of such intensive study. (29) Here is a definite challenge for geographers.

The emergence of environmental studies confronts the science with a vital decision: To join, or to remain independent! The experiment with social studies has already proven that geography can become a mere adjunct. Joining the environmentalists may eventually have similar results. However, common goals and a traditional atmosphere of cooperation, promise to make an alignment with earth sciences a fruitful and constructive combination. Such an alliance would also have considerable strength without sacrificing the identity of the member sciences. The pro's and con's of such a step will become the subject of much controversy. In favor of the argument is the consideration that becoming a member of the "team" now, on geography's own terms, would preclude a belated "hat in hand" entry with its attendant concessions. In many cases, this decision has already been made. Schools of Environment Sciences that include Geography, Geology and other sciences, are a reality. A precedent has been set. The disadvantages would entail the loss of some independence. On the whole, the advantages seem to outweigh the disadvantages.

Secondly, the need for geographers and geographic technicians is presently limited. Geographic functions are often performed by persons who do not think of themselves as geographers. Technicians could perform valuable research functions in cartography, data analysis, photo interpretation, visual aid preparation, teaching and consulting. With the exception of government intelligence agencies where technicians have made vital contributions, this specialty does not exist. Geographic technicians would be important to geography and the environmental and engineering sciences. Women could find useful and interesting employment. There is no doubt that more women will seek careers in the academic world. Geography has much to offer them. The science needs intelligent, ingenious and interested men and women. In addition, geographic knowledge and methods of investigation are definite assets to those in business, engineering, education, finance, law, administration, transportation and commerce. The doors must be open to those who take the subject as an elective.

Professional geographers have to re-direct their efforts toward needed objectives in planning, ecological research, disaster control, space research, conservation of resources and many others. Despite the temptation to focus on regional and local matters, geographers must retain grasp of global factors. By advising on laws and legislature, geographers could help to formulate and implement a balanced treatment of problems. With Man in Society as a target of geographic attention, involvement in law-making constitutes a primary area of academic activity. Preservation of resources, restoration of mining and industrial sites, planning and zoning laws and community planning are a few examples. Geographers were in the forefront when advocating a wiser use of resources and geographers denounced Raubbau practices. Restoring balance, investigating new techniques and methods, recommending measures to suit changeable conditions even on a global scale and devising solutions to problems, would make the science effective and a primary force

in the environmental science community. To mention just a few areas of investigation, geographers and geographic technicians could use their analytical skills to an even greater extent in anything that can be illustrated by maps. In fields like hydroponics, mariculture, per acre yields of tapioca, as well as in planning underground cables and pipes, mapping water and air pollution densities and observation of experiments abroad, geographers will find lucrative and rewarding challenges. The possibilities of relevant investigations are endless. The dualism of geography could be an asset and would give free reign to imaginative and important research. Geographers could place emphasis not only on that which is functional, but also that which is beautiful as well.

Comprehensive plans are never comprehensive as reality reveals shortcomings, omissions and flaws. Geographers, however, possess a measure of versatility that other sciences find difficult to match. There lies the strength of the science from which no amount of criticism can distract. Assembly-line techniques and land-use plans that are concerned only in the "comfort, convenience, security and well-being" of today's citizens, (30) must be replaced by more appropriate and imaginative measures. Geographers can and must move into the limelight with ideas that capture the imagination. In this, tomorrow's geographer will find his greatest challenge and delight.

* The third urgent need is the revitalization of geography in the schools. Before any sweeping results can be expected, the public must be aware of shortcomings and be receptive to changes. One of the tasks of the near future, is the winning of the public. A desire for comprehensive data and an interdisciplinary approach to existing problems has already been awakened. Richard Shramko's suggestion to create a "Quality of Life Index" has not only stirred the New York Times, but has appeared on the first page of Time magazine on the 8th of March 1971. Similar demands in editorials and broadcasts are a challenge to geography as a science that could provide such "indexes" or assessments. Life Quality Institutes as part of Geography departments or Environmental Studies schools, could do much to create a favorable public image.

School geography as an independent subject, or as part of environmental sciences - rather than social studies - would be the next goal. Geography departments at the institutions of higher learning will have to expand to meet a demand of about 3 per cent of graduates within the decade and a higher percentage when geographic technicians become widely accepted. Geography should be a major field of input for the environmental sciences.

Certification requirements for secondary school teachers will have to be stiffened. The U.S. federal survey to assess the general knowledge of Americans will reveal more startling facts. Geographers should not let this opportunity go unused to press for more comprehensive geography programs. The development of sorely needed analytical skills and the bridging of physical and social sciences should be the key in such school programs. The methods of teaching will have to be modified to increase interest and pertinence. The present stress on model teaching will have to be tempered by an emphasis on foundation building such as reading maps, aerial photographs and evaluating and analysing existing situations. Geography will teach

students to find solutions of their own and to make intelligent assessments that are meaningful and appropriate. Above all, geography in the secondary schools must be global in scope and familiarize students with the whole world and even the planets and stars.

The fourth consideration concerns the tools of the science. The primary tool, the map, is not an end in itself, but the basis for further study and organization of information. Aerial photographs and satellite photography will play an important part in the future. Infrared and color photography is gaining in importance and will become more apropos. Geographers have refrained from critizing the abundance of sub-standard maps now in use. Quality and inclusion of new data will have to receive more attention. School atlases and large-scale maps must become part of the educational process. New maps and representation of rural, urban and other problems will call for the perfection of new techniques in graphic representation. Microfilming and improved, true-to-scale enlargements will require a greater degree of precision. The metric system and perhaps the use of the 400° circle, will advance world-wide standards and a more internationalized basis for research and data exchange.

Quantification and computerization of geographic data has made giant strides, but calls for more perfection and wider use. Geographic technicians will take a greater part in computerized operations. The interrelation of data and the combination of physical and social information is becoming more and more a tool of the geographer. In the future, the computer will be the key in data reduction and perhaps dominate scheduling of priorities.

Geography is at the threshold of a new era. The challenges of our earth, as well as the challenges of the solar system, give the science a new impetus and a new direction. To solve existing problems and to rise to the occasion of future demands, geographers must present a united front and infuse the ancient science with new importance, with fresh imagination and with compelling ideas. Geography of the future must be relevant and provide solutions for practical as well as academic problems. Indeed, it is a bright future in which vision, enterprise, unity and imagination will make geography the Queen of Sciences. (31)

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